AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

1. (Currently Amended) A method, comprising:

detecting a signal received over a Rayleigh fading channel;, ~~and~~

estimating a Doppler spread associated with the Rayleigh fading channel based on an autocorrelation function of a sequence of complex channel estimates; and

using the estimated Doppler spread to estimate the Rayleigh channel,

wherein the channel estimate is combined with the received signal to compensate for a phase change caused by Rayleigh fading.

2. (Currently Amended) The method in claim 1, wherein the received signal includes a known ~~signal~~ sequence, the method further comprising:

obtaining the complex channel estimates from the known sequence in a first sampling interval and the known sequence in a second sampling interval.

3. (Original) The method in claim 2, further comprising:

complex-conjugating a sequence of complex channel estimates obtained from the known sequence in a first sampling interval, and

correlating the complex-conjugated sequence with a sequence of complex channel estimates obtained from a second sampling interval.

4. (Original) The method in claim 2, further comprising:

compensating the known sequence for a frequency offset.

5. (Original) The method in claim 4, wherein the frequency offset is determined using a correlation of the known sequence in the received signal.

6. (Currently Amended) The method in claim 4, further comprising:

using the estimated Doppler spread and the compensated known sequence to estimate the Rayleigh channel~~,~~

~~filtering an unknown sequence in the received signal using the channel estimate to compensate for phase changes caused by Rayleigh fading~~.

7. ~~The method in claim 1, further comprising:~~A method, comprising:

detecting a signal received over a Rayleigh fading channel;

estimating a Doppler spread associated with the Rayleigh fading channel based on an autocorrelation function of a sequence of complex channel estimates;

detecting a zero crossing of the complex correlation~~,~~; and

calculating the Doppler spread using the zero crossing and a Bessel function.

8. (Original) The method in claim 7, wherein the zero crossing is detected using interpolation.

9. (Canceled).

10. (Currently Amended) A method, comprising:

sampling a signal with a known sequence p_n received over a Rayleigh fading channel;~~,~~ ~~and~~

calculating a Doppler spread associated with the Rayleigh fading channel by autocorrelating a sequence of complex channel estimates obtained from the known sequence in a first sampling interval and the known sequence in a second sampling interval; and

calculating the autocorrelation using the following:

$$\hat{C} = \sum_{k=0}^{N} (p_k)^* \cdot (p_{k+l})$$

where $\hat{C}_l$ is an autocorrelation function, p_k and p_{k+l} are sequences of complex channel estimates, k is an index, * represents complex conjugate, l is a lag in the autocorrelation function, and N is a number of channel coefficients used for estimating the Rayleigh fading channel.

11. (Canceled).

12. (Currently Amended) The method in claim ~~11~~ 10, further comprising:

determining a zero crossing for the autocorrelation function $\hat{C}_l$.

13. (Original) The method in claim 12, wherein the zero crossing is a first zero crossing determined for the autocorrelation function $\hat{C}_l$ and is determined by interpolation.

14. (Original) The method in claim 12, further comprising:

using the zero crossing, calculating the Doppler spread $\hat{f}_d$ using the following:

$$\hat{f}_d = \frac{J_z}{2\pi \cdot i_z \cdot T_s}$$

where T_s is the sample time, i_z is the zero crossing for the autocorrelation function $\hat{C}_l$, and J_z is a lowest positive value that satisfies the following:

$$J_0(J_z) = 0$$

where J_0 is the zero-order Bessel function.

15. (Original) The method in claim 14, further comprising:

compensating the known sequence for a frequency offset.

16. (Original) The method in claim 15, wherein the frequency offset is determined using a correlation of the known sequence in the received signal.

17. (Currently Amended) The method in claim 15, further comprising:

using the estimated Doppler spread and the compensated known sequence to estimate the Rayleigh channel,

wherein the channel estimate ~~filters~~ is combined with an unknown sequence in the received signal to compensate for phase changes caused by Rayleigh fading.

18. (Currently Amended) The method in claim 14, further comprising:

using the estimated Doppler spread to estimate the Rayleigh channel,

~~filtering~~ combining an unknown sequence in the received signal ~~using~~ with the channel estimate to compensate for phase changes caused by Rayleigh fading.

19. (Currently Amended) Apparatus for use in a receiver, comprising:

a detector configured to detect a signal with a known sequence received over a Rayleigh fading channel associated with a communication with a transmitter, and

a Doppler spread estimator configured to estimate a Doppler spread associated with the Rayleigh fading channel including an autocorrelator configured to calculate an autocorrrelation function of a sequence of complex channel estimates determined using the known sequence;

a channel estimator configured to estimate the Rayleigh channel using the estimated Doppler spread; and

a combiner for combining an unknown sequence in the received signal with the estimated Rayleigh channel to compensate for phase changes caused by Rayleigh fading.

20. (Original) The apparatus in claim 19, wherein the complex channel estimates are obtained from the known sequence in a first sampling interval and the known sequence in a second sampling interval.

21. (Canceled).

22. (Canceled).

23. ~~The apparatus in claim 22, further comprising:~~ Apparatus for use in a receiver, comprising:

a detector configured to detect a signal with a known sequence received over a Rayleigh fading channel associated with a communication with a transmitter;

a Doppler spread estimator configured to estimate a Doppler spread associated with the Rayleigh fading channel including an autocorrelator configured to calculate an autocorrrelation function of a sequence of complex channel estimates determined using the known sequence;

a frequency offset compensator configured to compensate the known sequence for a frequency offset and to determine the frequency offset using a correlation of the known sequence in the received signal;

a channel estimator configured to estimate the Rayleigh channel using the estimated Doppler spread and the compensated known sequence~~,~~; and

~~wherein~~ a combiner for combining the channel ~~estimator is configured to filter~~ estimate with an unknown sequence in the received signal to compensate for phase changes caused by Rayleigh fading.

24. (Currently Amended) ~~The apparatus in claim 19, further comprising:~~ Apparatus for use in a receiver, comprising:

a detector configured to detect a signal with a known sequence received over a Rayleigh fading channel associated with a communication with a transmitter,

a Doppler spread estimator configured to estimate a Doppler spread associated with the Rayleigh fading channel including an autocorrelator configured to calculate an autocorrrelation function of a sequence of complex channel estimates determined using the known sequence,

a zero crossing detector configured to detect a zero crossing of the autocorrelation, and

wherein the Doppler spread estimator is configured to calculate the Doppler spread using the zero crossing and a Bessel function.

25. (Original) The apparatus in claim 24, wherein the zero crossing detector is configured to use interpolation to detect the zero crossing.

26. (Canceled).

27. (Currently Amended) An apparatus~~Apparatus~~, comprising:

means for sampling a signal with a known sequence p_n received over a Rayleigh fading channel, and

means for calculating a Doppler spread associated with the Rayleigh fading channel using an autocorrelation function of the Rayleigh fading channel determined using the known sequence samples in the received signal,

wherein the means for calculating calculates the autocorrelation function using the following:

$$\hat{C}_l = \sum_{k=0}^{N} (p_k)^* \cdot (p_{k+l})$$

where $\hat{C}_l$ is the autocorrelation function, p_k and p_{k+l} are sequences of complex channel estimates, K is an index, * represents complex conjugate, l is a lag in the autocorrelation function, and N is a number of channel coefficients used for estimating the Rayleigh fading channel.

28. (Canceled)

29. (Currently Amended) The apparatus in claim ~~30~~ 28, further comprising:

means for determining a zero crossing for the autocorrelation function $\hat{C}_l$.

30. (Currently Amended) The apparatus in claim ~~31~~ 28, wherein the zero crossing is a first zero crossing determined for the autocorrelation function $\hat{C}_l$ and is determined by interpolation.

31. (Original) The apparatus in claim 30, wherein the means for calculating uses the zero crossing to calculate the Doppler spread f_d in accordance with the following:

$$\hat{f}_d = \frac{J_z}{2\pi \cdot i_z \cdot T_s}$$

where T_s is the sample time, i_z is the zero crossing of the autocorrelation function $\hat{C}_l$, and J_z is a lowest positive value that satisfies the following:

$$J_0(J_z) = 0$$

where J_0 is the zero-order Bessel function.

32. (Original) The apparatus in claim 31, further comprising:

means for compensating the known sequence for a frequency offset.

33. (Original) The apparatus in claim 32, wherein the frequency offset is determined using a correlation of the known sequence in the received signal.

34. (Original) The apparatus in claim 33, further comprising:

means for estimating the Rayleigh channel using the estimated Doppler spread and the compensated known sequence,

wherein the estimated channel is used to compensate an unknown sequence in the received signal for phase changes caused by Rayleigh fading.

35. (Original) The apparatus in claim 27, further comprising:

means for estimating the Rayleigh channel using the estimated Doppler spread,

wherein the estimated channel is used to compensate an unknown sequence in the received signal for phase changes error caused by Rayleigh fading.